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## Predictive Capacity of Anxiety on Neuroticism in Spanish Children

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### Abstract

**Objective:** To analyze the influence of anxiety on high levels of neuroticism in children.

**Methods:** The Visual Analogue Scale for Anxiety-Revised (VAA-R) and the Big Five Questionnaire-Children version (BFQ-C) were completed by 911 primary education students aged 8 to 12 years old (M=9.53, SD=1.10). Data were analyzed by the logistic regression method and the predictive capacity of anxiety was established by the odds ratio (OR).

**Results:** The three factors and the total score of the VAA-R positively predicted high scores in neuroticism, with OR values between 1.02 and 1.05.

**Conclusion:** It is essential to evaluate anxiety early because of the influence that it has on the appearance of high levels of neuroticism.

**Keywords:** Anxiety; Predictive capacity; Neuroticism; Childhood; Primary education

### Abbreviations

VAA-R: Visual Analogue Scale for Anxiety-Revised; AA: Anticipatory Anxiety; SA: School-based performance Anxiety; GA: Generalized Anxiety; BFQ-C: Big Five Questionnaire-Children; OR: Odds Ratio

### Introduction

Anxiety is an adaptive emotion that alerts individuals of possible threats but if it is manifested with excessive intensity, frequency and duration, it can result in pathology [1]. Although anxiety is closely related to neuroticism, there is a clear differentiation between both variables. In this way, neuroticism consists in the manifestation of unpleasant emotional states, including anxiety [2]. Therefore, the distinction between is clear because anxiety is one of the neuroticism expressions.

Numerous research studies have identified a positive correlation between anxiety and neuroticism in adult population, using both general [3-5] and clinical [6-9] samples. Regarding the analysis of this relationship in university adult population, two studies conducted in China have been found. First, Shi et al pointed out that neuroticism is positively associated with anxiety [10]. Subsequently, He et al concluded that neuroticism acts as a significant predictor of anxiety symptoms [11].

Regarding the relationship between both variables in child and adolescent population, Hoferichter and Raufelder. found a positive relationship between neuroticism and test anxiety in a sample of German adolescents [12]. In Spain, Delgado et al recently identified that adolescents with high scores in social anxiety are more likely to score high in neuroticism [13]. Likewise, the studies by Muris et al and Andrés et al concluded that there is a positive correlation between neuroticism and anxiety in children samples from the Netherlands and Argentina, respectively [14,15].

Considering the scientific literature review above-mentioned, the studies that have analyzed the possible relationship between anxiety and neuroticism have not considered the complexity of both variables. Thus, it would be convenient to contemplate anxiety disorders during childhood, due to the diversity of academic situations that can provoke its appearance [16]. In addition, the empirical evidence on this subject in Spain is limited to the adolescent stage.

Consequently, the aim of the present study was to explore the predictive capacity of anxiety on high scores in neuroticism in Spanish children. Considering the predictive capacity of social anxiety

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**Table 1:** Binary logistic regression for the probability of experiencing neuroticism as a function of the factors and the total score of the VAA-R.

	Variable	$\chi^2$	R <sup>2</sup>	B	SE	Wald	p	OR	95% CI
AA	Classified correctly: 60.4%	14.75	0.05	0.04	0.01	13.97	< 0.001	1.04	1.01-1.06
	Constant			-0.65	0.15	18.46	< 0.001	0.52	
SA	Classified correctly: 61.7%	13.46	0.04	0.05	0.01	13.02	< 0.001	1.05	1.02-1.08
	Constant			-0.77	0.18	17.65	< 0.001	0.47	
GA	Classified correctly: 59.9%	6.24	0.02	0.04	0.02	6.12	0.01	1.04	1.00-1.08
	Constant			-0.54	0.16	11.14	0.001	0.58	
Total	Classified correctly: 59.3%	17.6	0.06	0.02	0.01	16.56	1	1.02	1.01-1.03
	Constant			-0.88	0.19	21.25	1	0.42	

**Note:** AA: Anticipatory Anxiety; SA: School-based performance Anxiety; GA: Generalized Anxiety; Total: Total score in anxiety;  $\chi^2$ : Chi-square; R<sup>2</sup>: Nagelkerke square; B: Regression coefficient; SE: Standard Error; Wald: Wald test; p: Probability; OR: Odd ratio; CI: Confidence interval.

on neuroticism in Spanish adolescents [13], as well as the positive correlation between both variables identified in children of other cultures [14,15], it is expected that both total anxiety scores and those referring to anxiety disorders originated in the school environment positively influence on high scores in neuroticism.

## Materials and Methods

The sample consisted of 911 primary school students aged 8 to 12 years old (M=9.53, SD=1.10), who were enrolled in seven schools in the province of Alicante (Spain). 50.6% of the participants were male. The Visual Analogue Scale for Anxiety-Revised (VAA-R) [17] and the Big Five Questionnaire – Children version (BFQ-C) [18,19] were randomly administered and they used a counterbalanced measures design in the classrooms of the schools. They were filled in an anonymous way and previous informed consent of the participants' legal tutors was requested and obtained from all the participants.

The VAA-R is a self-report measure that assesses three dimensions of anxiety disorders generated in the school environment: Anticipatory Anxiety (AA), with 5 items about the Separation Anxiety Disorder; School-based performance Anxiety (SA), with 3 items related to the Social Anxiety Disorder; and Generalized Anxiety (GA), with 3 items related to the Generalized Anxiety Disorder. This was designed for children and adolescents aged 8 to 19 years. The response scale is visual and consists of 10 points (nervous vs. steady). At present, there is no validation of the scale scores in Spanish population. Therefore, for this study, this instrument has been adapted to Spanish using the inverse translation method, showing adequate internal consistency indices (between 0.72 and 0.91, for the GA factor and the total score, respectively).

The BFQ-C is an instrument that assesses factors related to the five great personality traits: Extraversion, Kindness, Consciousness, Neuroticism and Openness to experience (with 13 items each). This must be completed by population aged 9 to 14 years old. It has a Likert type response scale of 5 points (A=almost always, E=hardly ever). The validation of the BFQ-C scores in the Spanish sample showed satisfactory Cronbach alpha coefficients (between 0.78 and 0.88, for the Neuroticism and Consciousness factors, respectively) [19].

For the analysis of data, binary logistic regression was used. Specifically, the step-by-step regression procedure based on the Wald statistic was carried out. The predictive capacity of anxiety on high neuroticism was estimated with the odds ratio (OR), interpreting it according to the following indicators: OR>1 reports a prediction in a positive sense, OR<1 reports a prediction in a negative sense, and OR=1 reports the non-existence of prediction [20]. These statistical

analyses were performed with the SPSS/PC 24.0 computer program.

## Results and Discussion

Table 1 shows the results referring to the probability of obtaining high scores in the neuroticism variable according to the factors and the total score of the VAA-R. The percentage of cases correctly classified by the logistic models hovered around 59.3% for the total score and 61.7% for the SA. The adjustment value of the models (Nagelkerke's R<sup>2</sup>) ranged between 0.02 for GA and 0.06 for the total score in anxiety.

In relation to the three factors of the VAA-R, the probability of students showing high levels of neuroticism was 1.04 times higher for each unit that AA was increased, 1.05 times higher for each point that SA was increased, and 1.04 times higher for each unit that GA was increased. The OR obtained for the total score of the VAA-R reported that the probability of scoring high in neuroticism was 1.02 times higher for each point that anxiety was increased.

These results confirmed the initial hypothesis since total anxiety scores positively predicted high scores in neuroticism. In the same vein, scores of the VAA-R factors related to Separation Anxiety Disorder, Social Anxiety Disorder and Generalized Anxiety Disorder also had a positive influence on obtaining high levels of neuroticism.

The findings of this research are consistent with the studies of Muris et al and Andrés et al which determined a positive correlation between anxiety and neuroticism in children samples from the Netherlands and Argentina [14,15]. Therefore, Spain joins the set of countries in which there is empirical evidence that both variables do not develop independently in childhood. In this sense, the present study broadens the evolutionary range of scientific evidence about the predictive capacity of social anxiety in Spain. Thus, Delgado et al concluded that adolescents with high scores in social anxiety showed a higher probability of experiencing high neuroticism [13], and in this research it has been found that in children the SA factor scores related to Social Anxiety Disorder significantly and positively predict high scores in neuroticism.

However, in future research it would be convenient to consider some aspects that have not been taken into consideration in this study. On the one hand, empirical evidence has been obtained so far of the predictive capacity of anxiety on neuroticism in Spanish children and adolescents but it is still unknown if this pattern remains the same in adulthood. On the other hand, it has not been analyzed if the predictive model found in this research differs depending on the sex of the participants.

## Conclusion

This research work empirically demonstrates that anxiety acts as a predictive variable of neuroticism in a sample of Spanish children. In addition, it has considered the complexity of the anxiety variable, obtaining scores referring to the anxiety disorders that tend to be originated in the school environment: Separation Anxiety Disorder, Social Anxiety Disorder and Generalized Anxiety Disorder. Consequently, the findings of this study suggest that the professionals of educational psychology should evaluate anxiety early, because of the existing probability that affected children could subsequently experience a high neuroticism.

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